97TH CONGRESS
2d Session

HOUSE OF REPRESENTATIVES

REPT. 97-349
Part IV

SMALL BUSINESS INNOVATION DEVELOPMENT ACT

MARCH 16, 1982.—Ordered to be printed

Mr. FUQUA, from the Committee on Science and Technology, submitted the following

REPORT

together with

ADDITIONAL VIEWS

[To accompany H.R. 4326]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science and Technology, to whom was referred the bill (H.R. 4326) to amend the Small Business Act to strengthen the role of the small, innovative firms in federally funded research and development, and to utilize Federal research and development as a base for technological innovation to meet agency needs and to contribute to the growth and strength of the Nation's economy; having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

The amendment is as follows:

Strike all after the enacting clause and insert in lieu thereof the following:

SECTION 1. This Act may be cited as the "Small Business Innovation Development Act".

SEC. 2. (a) The Congress finds that—

(1) technological innovation creates jobs, increases productivity, competition, and economic growth, and is a valuable counterforce to inflation and the United States balance-of-payments deficit;

(2) while small business is a principal source of significant innovations in the Nation, the majority of federally funded research and development is conducted by large businesses, universities, and Government laboratories; and

(3) small businesses are among the most cost-effective performers of research and development and are particularly capable of developing research and development results into new products.

(b) Therefore, the purposes of this Act are—

H703-1

(1) to stimulate technological innovation;

(2) to encourage the greater utilization of small business to meet Federal research and development needs; and

(3) to increase private sector commercialization of innovations derived from Federal research and development.

SEC. 3. Section 9(b) of the Small Business Act is amended—

(1) by striking out "and" at the end of paragraph (2);

(2) by striking out the period at the end of paragraph (3) and inserting in lieu thereof a semicolon; and

(3) by adding at the end thereof the following:

"(4) to develop and maintain a source file and an information program to assure each qualified and interested small business concern the opportunity to participate in Federal agency small business innovation research programs;

"(5) to coordinate with participating agencies a schedule for release of SBIR solicitations, and to prepare a master release schedule so as to maximize small businesses' opportunities to respond to solicitations;

"(6) to report annually to the Office of Science and Technology Policy on the SBIR program responsibilities assigned to it under this Act; and

"(7) to report not less than annually to the Senate and the House of Representatives on the SBIR programs of the Federal agencies and the Administration's responsibilities related to the SBIR programs.".

SEC. 4. Section 9 of the Small Business Act is amended by adding at the end thereof the following new subsections:

"(e) For the purpose of this section—

"(1) the term 'Federal agency' means an executive agency as defined in section 105 of title 5, United States Code, or a military department as defined in section 102 of such title;

"(2) the term 'funding agreement' means any contract, grant, or cooperative agreement entered into between any Federal agency and any small business for the performance of experimental, developmental, or research work funded in whole or in part by the Federal Government;

"(3) the term 'small business innovation research program' or 'SBIR program' means a competitive program designed to involve small businesses in meeting Federal research and development objectives and to promote innovation through a uniform process having—

"(A) a first phase for determining, insofar as possible, the scientific and technical merit and feasibility of proposals submitted pursuant to SBIR program solicitations;

"(B) a second phase to further develop the proposals to meet the particular program needs, the awarding of which shall take into consideration the scientific and technical merit and feasibility evidenced by the first phase and, if two or more proposals are evaluated as being of approximately equal scientific and technical merit and feasibility, special consideration shall be given to those proposals that have demonstrated third phase, private capital commitments; and

"(C) when appropriate, a third phase in which commercial applications of the research or research and development are pursued with private capital or in which contracts are made with a Federal agency for products or processes intended to benefit the United States Government; and

"(4) the term 'research' or 'research and development' means any activity which is (A) a systematic, intensive study directed toward greater knowledge or understanding of the subject studied; (B) a systematic study directed specifically toward applying new knowledge to meet a recognized need; or (C) a systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

"(f)(1) Each Federal agency which has total appropriations in excess of $100,000,000 for research or research and development for fiscal year 1983 or any fiscal year thereafter shall establish a SBIR program.

"(2) Each Federal agency which is required to establish a SBIR program under paragraph (1) shall, to the extent required in Acts authorizing appropriations for each such agency, reserve for expenditure with small business concerns in connection with such SBIR program—

"(A) not less than 0.2 per centum of its total appropriations for research or research and development in the first fiscal year in which it is required to establish a SBIR program,

"(B) not less than 0.6 per centum of such total appropriations in the second such fiscal year, and

"(C) not less than 1 per centum of such total appropriations in all subsequent such fiscal years.

"(g) For the purpose of meeting the requirements of subsection (f), no Federal agency shall make available, from that portion of its total appropriations for research or research and development which is available for obligation for basic research, an amount which exceeds 0.2 per centum of such portion in the first fiscal year in which it is required to establish a SBIR Program, 0.6 per centum of such portion in the second such fiscal year, or 1 per centum of such portion in subsequent such fiscal years.

"(h) Each Federal agency required by subsection (f) to establish a small business innovation research program shall—

"(1) unilaterally determine categories of projects to be in its SBIR program;

"(2) issue small business innovation research solicitations in accordance with a schedule determined cooperatively with the Small Business Administration;

"(3) unilaterally receive and evaluate proposals resulting from SBIR solicitations;

"(4) unilaterally select awardees for its SBIR funding agreements;

"(5) administer its own SBIR funding agreements (or delegate such administration to another agency);

"(6) make payments to recipients of SBIR funding agreements on the basis of progress toward or completion of the funding agreement requirements; and

"(7) make an annual report on the SBIR program to the Small Business Administration and the Office of Science and Technology Policy.

"(i) In addition to the requirements of subsection (f), each Federal agency which has total appropriations in excess of $20,000,000 for research or research and development for fiscal year 1983 or any fiscal year thereafter shall establish goals specifically for funding agreements for research or research and development to small business concerns.

"(j) Each Federal agency required by this section to have a SBIR program or to establish goals shall report annually to the Small Business Administration the number of awards pursuant to funding agreements over $10,000 in amount and the dollar value of all such awards, identifying SBIR awards and comparing the number and amount of such awards with awards to other than small business concerns.

"(k) In addition to the requirements of subsection (h), each Federal agency shall encourage and facilitate the general conduct of its SBIR program to provide maximum opportunity for small businesses to engage in specified agency research and development objectives through the establishment of procedures which provide for—

"(1) simplified, standardized, and timely SBIR solicitations; and

"(2) a simplified, standardized funding process which provides for (A) the timely receipt and review of proposals; (B) outside peer review, as appropriate; (C) protection of proprietary information provided in proposals; (D) selection of awardees; (E) retention of rights in data generated in the performance of the contract by the small business concern; (F) transfer of title to property provided by the agency to the small business concern if such a transfer would be more cost effective than recovery of the property by the agency; (G) cost sharing; and (H) cost principles and payment schedules.

"(l) The Director of the Office of Science and Technology Policy, in consultation with the Federal Coordinating Council for Science, Engineering and Technology, shall—

"(1) independently survey and monitor all phases of the implementation and operation of SBIR programs within agencies required to establish a SBIR program, including compliance with the expenditures of funds according to the requirements of subsection (f) of this section; and

"(2) report not less than annually, and at such other times as the Director may deem appropriate, to the Senate and the House of Representatives on all phases of the implementation and operation of SBIR programs within agencies required to establish a SBIR program, together with such recommendations as the Director may deem appropriate.".

SEC. 5. The Comptroller General shall, not later than 5 years following the enactment of this Act, report to the Senate and the House of Representatives on the quality, quantity, and nature of research conducted under the amendments made by this Act, and the effect the amendments made by this Act have had on the agencies' research and development programs, together with such recommendations as the Comptroller General may deem appropriate.

BEST COPY AVAILABLE

CONTENTS

	Page
Amendment	1
Purposes of the bill	4
I. Summary	4
A. Background and principal issues	4
B. Brief explanation of H.R. 4326, as reported by the Committee on Science and Technology	5
C. Effect of committee amendment	6
D. Committee recommendations	7
II. Legislative history	10
A. Background	10
B. Committee activities on H.R. 4326	11
III. Background	13
A. Introduction	13
B. State of small business participation in Federal R. & D.	13
C. Barriers to small business participation in Federal R. & D. and recent congressional initiatives	15
D. Small business innovation and capital availability	16
E. Brief history of the NSF small business innovation research program	18
IV. Issues involved in H.R. 4326	19
A. Federal-wide expansion of the SBIR program	19
B. The SBIR set-aside	20
1. Policy implications of the set-aside	21
2. Impact on basic research	22
3. Amount of the set-aside	25
C. Peer review	26
D. Lead agency	27
1. Program oversight	27
2. Policy directives	28
V. Section-by-section analysis	28
VI. Impact on inflation	32
VII. Committee oversight findings and recommendations	32
VIII. Summary of government operations committee oversight findings and recommendations	32
IX. Budget analysis and projection	32
X. Congressional budget office cost estimate	32
XI. Committee recommendation	36
XII. Changes in existing law made by the bill, as reported	36
Additional views	40

Purposes of the Bill

The purposes of the bill are threefold:

(1) to stimulate technological innovation;

(2) to encourage the greater utilization of small businesses to meet federal research and development needs; and

(3) to increase private sector commercialization of innovations derived from federal research and development.

I. Summary

A. Background and principal issues

Small, high technology businesses have contributed significantly to the nation's economic growth and have been very innovative. The recognition of the ability of the small firm to develop and market new technologies, coupled with the apparently declining rate of innovation and productivity in U.S. industry as a whole, have led to widespread interest in the problems of the small busi-

ness community and the amount of federal research and development funding which is flowing into this sector.

The bill, H.R. 4326, seeks to address the issue of improving the innovative capabilities of small businesses by establishing Small Business Innovation Research (SBIR) programs within federal departments and agencies with research and development (R&D) budget over $100 million. Agency programs would be funded with a portion of the agency's R&D funds.

The Committee on Science and Technology has had a long standing interest in the subject of small business innovation. The Committee also has jurisdiction over six of the agencies which would be required to have SBIR programs, including the NSF, whose SBIR program is the model for the legislation. The House Rules assign to the Science and Technology Committee oversight responsibilities of all civilian research and development. For these reasons, the Committee requested sequential referral of H.R. 4326, the Small Business Innovation Development Act. The bill was sequentially referred to the Committee on November 20, 1981.

The Full Committee held three days of hearings on H.R. 4326 on January 26, 27, and 28, 1982. The Committee's review focused on the following issues: What information exists regarding the role of small companies and the level of their participation in federal R&D; the necessity and feasibility of federal-wide expansion of the small business innovation research program; whether a set-aside is the optimum mechanism for stimulating small business innovation and increasing small business participation in federal R&D; and what type of program, if any, would be most effective.

On March 9, the Committee considered H.R. 4326 and ordered the bill reported with an amendment. The Committee's amendment preserves the intent of H.R. 4326, as reported by the Small Business Committee. The Committee amendment is summarized in section B below and the effect of the Committee amendment is summarized in section C.

The Committee amendment reflects the recommendations summarized in section D.

B. BRIEF EXPLANATION OF H.R. 4326, AS REPORTED BY THE COMMITTEE ON SCIENCE AND TECHNOLOGY

The bill provides that each federal agency with an appropriation for R&D over $100 million is required to establish a small business innovation research program.

Each agency required to have a program will reserve for expenditure in connection with the SBIR program no less than 1 percent of its R&D appropriations. The 1 percent is phased-in over a 3-year period. The bill places a 1 percent "cap" on the amount of an agency's basic research funds which can be used for the SBIR program.

Authorization to fund the SBIR programs will be provided to the extent required in acts authorizing appropriations for each agency.

Agencies with an appropriation for R&D in excess of $20 million shall establish goals for funding agreements for research and development to small business concerns.

Each agency authorized to establish an SBIR program is required to establish procedures which are provided in the Act, to encourage and facilitate the general conduct of its SBIR program to provide maximum opportunity for small businesses to engage in specified agency research and development objectives.

The Small Business Administration shall coordinate with participating agencies a schedule for the release of SBIR solicitations and provide information to small business concerns about the agency SBIR programs. SBA is required to report to the Office of Science and Technology Policy (OSTP) on the program responsibilities assigned to it. SBA must also report annually to the Congress.

OSTP shall independently survey and monitor the operations of agency SBIR programs and report to Congress annually, with appropriate recommendations.

The Comptroller General, not later than 5 years following the enactment of H.R. 4326, shall report to the Congress on the quality, quantity, and nature of research conducted under the amendments made by the Act, and the effect the amendments made by the Act have on the agencies' research and development programs.

C. EFFECT OF COMMITTEE AMENDMENT

The committee amendment strikes all after the enacting clause and inserts new text for the bill. The amendment preserves the intent of H.R. 4326, making few substantive changes to the bill as reported by the Small Business Committee.

1. The bill preserves the threshold requirement concerning agencies required to establish an SBIR program, but clarifies that the qualification be based on an agency's appropriation for research and development.

2. The amendment reduces the set-aside provision from 3 percent to 1 percent.

3. Agencies will be required to reserve for funding the SBIR program 1 percent, phased in over 3 years, of the agency's appropriation for R&D. Amounts reserved will be authorized through the normal budget process.

4. No more than 1 percent of an agency's basic research funds will be available for the support of agency SBIR programs.

5. Agencies with R&D appropriations over $20 million will establish goals for funding agreements for R&D to small business concerns, but the requirement for escalating goals is eliminated.

6. Agencies will operate SBIR programs independently, subject to specific guidelines in the bill. Procedures for peer review will be utilized, as appropriate.

7. The Small Business Administration will disseminate information to small business concerns regarding the agency SBIR programs. No policy role is assigned to the SBA.

8. The Office of Science and Technology Policy has responsibility for lead agency oversight.

9. The GAO will survey and report to Congress on agency SBIR programs and their effect on federal R&D programs.

D. COMMITTEE RECOMMENDATIONS

The Committee on Science and Technology recommends the adoption of the Committee amendment to H.R. 4326, which was ordered reported by unanimous voice vote, a quorum being present, on March 9, 1982.

The committee amendment is based on specific recommendations, which follow. Elaboration of the background and major issues involved in H.R. 4326 can be found in sections III and IV of this report.

Concerning the state of small business participation in Federal research and development

The committee is concerned about apparent gaps in the data concerning the small business share of federal R&D and recommends that a policy decision concerning the necessity of a mandatory set-aside be reserved pending the analysis of more complete data. In this regard, the committee is requesting the General Accounting Office to undertake a review of the small business share of federal research and development funding. For the present time, the committee believes that small business participation in federal research and development will be facilitated to a significant degree by the establishment of small business innovation research programs. The committee amendment provides that 13 agencies will establish small business innovation research programs. Funding for agency SBIR programs will be provided through the normal budget process, although the legislation provides specific goals (1 percent of agency R&D funds) for the funding of agency SBIR programs, which is to be taken from existing agency funds.

The committee believes, however, that the state of small business participation in federal R&D does not warrant, at this time, the use of what amounts to a new entitlement program, a set-aside of agency R&D funds as envisioned in H.R. 4326, as amended by the Small Business Committee.

Concerning the barriers to small business participation in Federal R&D

The federal-wide expansion of the small business innovation research program should significantly enhance the opportunities for small business to participate in federal research and development. However, the committee is concerned about the potential risks involved in expanding the NSF program, which is funded at a level of $5 million annually, to a federal-wide program funded through a mandatory set-aside of (1 percent to 3 percent) agency R&D funds. Such a proposal contains the appropriations for the new untried program in addition to the new authorization establishing it. The committee feels any potential financial risks will be alleviated by subjecting agency funds for SBIR programs to the normal Congressional review of authorizations and appropriations. Through this process the authorizing committees of Congress can ensure the most desirable and realistic level of funding for agency SBIR programs and their consistency with the priorities determined by the Congress through the normal budget process.

Concerning small business innovation and capital availability

The committee intends that funds provided through agency SBIR programs supplement, but not supplant, private capital. The committee recognizes that recent changes in tax law have a substantial impact on the availability of venture capital. In particular, the committee is interested in monitoring these effects and their influence on the availability of risk capital for early stage, high risk ventures. Consequently, the committee believes that a careful approach to federal-wide expansion and funding of agency SBIR programs is desirable. The committee amendment provides for this through regular authorization of agency SBIR programs, which will enable the Congress to respond effectively to future capital fluctuations and trends, and their effect on a federal-wide SBIR program.

Concerning Federal-wide expansion of the small business innovation research program

The committee endorses the federal-wide expansion of the SBIR program. The committee recognizes that the program should be structured in a manner which will reflect the inherent differences in agency missions and responsibilities. To the extent that agencies must diverge from the program parameters contained in the legislation, the committee feels that changes can be addressed through the regular authorization process.

This mechanism will allow the other departments the flexibility (which is presently afforded to the NSF and DOD) to develop a program which meets the agencies missions and operating styles. Congressional legislative oversight will ensure that the SBIR effort is implemented, but in a manner which reflects the organizational realities within the federal departments and agencies.

Concerning the use of a set-aside for small business innovation research programs

The committee believes that the Congress should seriously consider the policy implications which are raised by the proposed set-aside mechanism. Primarily, the committee is concerned that the effect of the set-aside is to establish actual appropriations for a new program by skirting the normal budget process, potentially altering spending priorities and funding for programs and projects which are determined by Congress in authorizations and appropriations.

The committee is not convinced that a mandatory set-aside of agency R&D funds is necessary for start-up of a federal-wide program. Nor is the set-aside the optimum approach to the funding of agency small business innovation research programs, for several reasons. The first concerns the experimental nature of the National Science Foundation's Small Business Innovation Research program. The second concerns the lack of evidence that there are enough small high technology firms capable of performing the high quality research to absorb the amount of funds which would be made available under the set-aside requirement.

The committee's amendment specifically addresses these concerns, by requiring regular Congressional review of programmatic and funding requirements of a federal-wide SBIR program. The

committee believes that this regular review which will be provided through the normal authorization and appropriations process is essential to ensure the success of a federal-wide program.

The committee strongly recommends against a mandatory set-aside of the federal R&D budget. Not only is the set-aside unwise public policy; it is neither a desirable nor a necessary mechanism to implement a federal-wide SBIR program.

Concerning basic research

The committee concludes that any benefits to be realized through the federal-wide expansion of the small business innovation research program would be short-lived if achieved at the expense of the nation's basic research. The committee is concerned, however, that agency basic research funds may be vulnerable to disproportionate reductions to provide funds necessary to support agency small business innovation research (SBIR) programs. To ensure that this does not occur, the committee recommends that special precautions be taken to protect agency basic research funds. The commmittee amendment provides for this protection in two ways. First, the committee recommends the placement of a limitation of 1 percent on the portion of an agency's basic research funds which can be utilized for the support of an agency's SBIR program. The committee recognizes that the protection afforded to agency basic research funds through this mechanism will be limited. Consequently, the committee amendment provides that funds reserved for agency SBIR programs be authorized under the normal budget process. Through this process, the Congress can ensure that funding of agency SBIR programs is achieved consistent with Congressional intent and without detrimental impact on the nation's basic research effort.

Concerning peer review

The committee feels that decisions concerning the utilization of the peer review process for evaluation of agency SBIR proposals be made by the agency required to have an SBIR program. There appears to be little rationale for requiring agencies to depart from the methods and procedures which have evolved in various agencies consistent with their research purposes and organizational structures. Thus, whether to use peer review is best determined by the agency in structuring its SBIR program.

Concerning lead agency responsibilities

The amendment contains explicit guidelines for agencies to follow in the structuring of SBIR programs. As a result, the committee feels that a central Executive agency role other than that envisioned for the Office of Science and Technology Policy, is unnecessary. The committee notes that the National Science Foundation's SBIR program and the DOD Small Business Advanced Technology (SBAT), although similar, have operated effectively without the additional involvement of SBA or another agency. The committee believes that autonomy of agency programs is an important feature of the amendment, and one which will enhance the efficiency and effectiveness of agency SBIR programs. The committee does not expect this change will diminish in any

way the ability of small business concerns to participate in agency SBIR programs. SBA will continue to be involved in the coordination of agency programs, including dissemination of information to small business concerns. Providing agencies the autonomy to run the SBIR programs is also expected to result in reduced administrative costs.

Concerning congressional oversight

The committees having jurisdiction over agencies required to establish a SBIR program shall exercise oversight responsibility over the operation of the SBIR program within their respective agencies together with committees on Small Business of the Senate and House of Representatives.

II. Legislative History

A. BACKGROUND

On November 20, 1981, the Committee on Science and Technology was granted sequential referral of the bill, H.R. 4326, the Small Business Innovation Development Act. The bill was also sequentially referred to the Committees on Armed Services and Energy and Commerce, and on December 8, 1981, the Veterans Affairs Committees was granted sequential referral. On March 2, the Committee on Foreign Affairs and the Select Committee on Intelligence received sequential referral of the bill.

During the first session of the 97th Congress, numerous bills [1] were introduced which contained as their principal thrust the requirement that each federal agency with an R&D budget over $100 million establish a small business innovation research (SBIR) program, modeled after the program at the National Science Foundation. All of the bills provided funding for the support of agency SBIR programs through the set-asides of agency funds for research and development. The amount of the set-asides varied, ranging from 1 percent to 3 percent of the federal research and development budget. All of the aforementioned bills were initially referred to the Committee on Small Business.

The Committee on Science and Technology has had a long standing interest in the subject of small business innovation. During the 96th Congress, the Committee joined with the House and Senate Small Business Committees in hearings on "Innovation—Start-up, Growth and Survival of Small, New Technology Firms" (Committee Print No. 93). Extensive hearings followed before the Subcommittees on Science, Research and Technology and Investigations and Oversight on "Small, High Technology Firms and Innovation" (Committee Print No. 167). More recently, the Subcommittee on Investigations and Oversight held hearings on "Small, High Technology Firms, Inventors and Innovation" (Committee Print No. 43).

It was in the same spirit that the Chairman of the Committee, and the Chairman of the Subcommittee on Science, Research and Technology, requested the opportunity to participate at the Small Business Committee's Subcommittee on General Oversight's one-

[1] H.R. 3091, 4254, 4326, 4373, and 4343.

day hearing on pending [2] small business innovation research legislative on September 15, 1981.

On September 18, 1981 the Chairman requested sequential referral of any bill concerning the establishment of agency (SBIR) programs in agencies with R&D budgets over $100 million which might be reported by the Small Business Committee. The request for referral was based on the following reasons:

(1) Clause (1)(r), Rule X, of the Rules of the House of Representatives assigns the Committee on Science and Technology specific jurisdiction over "scientific research and development."

In addition, the rule gives the Committee specific legislative jurisdiction over the National Aeronautics and Space Administration, the National Science Foundation, R&D in the Department of Energy, and R&D in the Environmental Protection Agency. All of these agencies would be required to have SBIR programs under the provisions of H.R. 4326.

(2) Clause 2(b) and Clause 3(f), Rule X, assign the Committee on Science and Technology general and special oversight of "all laws, programs and government activities" involving research and development, other than military research and development.

(3) The legislation assigned to the National Science Foundation, an agency under the Committee's purview, the function of assisting the Administrator of the Office of Federal Procurement Policy in the promulgation of regulations under the Act. This requirement, which was eliminated in the reported version of H.R. 4326, would have had the effect of amending the National Science Foundation's Organic Act.

(4) The significant influence of a mandated set-aside (3 percent of the fiscal year 1982 federal R&D budget=$1.2 billion) on the scope and direction of the federal R&D budget, coupled with the implications for the lead federal agency responsible for the support of scientific research (see item No. 3 above) suggested that the measure is a matter of national science policy. The precedent for the Committee's involvement in national science policy lies in Public Law 94-282, the "National Science and Technology Policy, Organization, and Priorities Act of 1976."

On November 20, H.R. 4326 was reported with an amendment by the Committee on Small Business, and the Committee's request for sequential referral was granted by the Speaker.

With the Committee's concurrence, the Chairman retained H.R. 4326 at the Full Committee. This decision was based on the bill's legislative relevance to six of the Committee's subcommittees.

B. COMMITTEE ACTIVITIES ON H.R. 4326

On December 7, 1981, the Full Committee held a briefing on the two small business innovation research (SBIR) programs currently in operation within federal agencies. The committee was briefed on the National Science Foundation's Small Business Innovation Research Program by Mr. Roland Tibbetts, Program Manager of the National Science Foundation's SBIR program. Mr. Hal Felsher, Consultant to the Department of Defense, briefed the Committee

[2] Ibid.

on the Department of Defense's Small Business Advanced Technology Program.

On January 26, 27, and 28, 1982, the Full Committee held three days of hearings on H.R. 4326, the Small Business Innovation Development Act. Testimony was also invited on the Senate counterpart measure, S. 881, which passed the Senate on December 8, 1981. The Committee received testimony from the following witnesses:

Honorable Edward M. Kennedy (D); U.S. Senator from Massachusetts.

Honorable Warren Rudman (R); U.S. Senator from New Hampshire.

Denis Prager, Associate Director; Office of Science and Technology Policy.

Donald Templeman, Deputy Administrator; Small Business Administration.

Donald N. Langenberg, Deputy Director; National Science Foundation.

Stuart J. Evans, Director of Procurement; National Aeronautics and Space Administration.

Hilary Rauch, Director of Procurement and Assistance Management; U.S. Department of Energy.

Henry Kirschenmann, Deputy Assistant Secretary for Grants and Procurement; U.S. Department of Health and Human Services.

Morton Myers, Director, Program Analysis Division; General Accounting Office.

Honorable John J. LaFalce (D–NY), Chairman, Subcommittee on General Oversight; Committee on Small Business.

Honorable Berkeley Bedell (D–IA); Member of Congress.

Myron Tribus, Director, Center for Advanced Engineering Study; Massachusetts Institute of Technology.

Kenneth W. Chilton, Associate Director, Center for the Study of American Business; Washington University.

Donald Kennedy, President; Stanford University (Representing the Association of American Universities).

Robert Q. Marston, President; University of Florida (Representing the National Association of State Universities and Land Grant Colleges).

Thomas K. Oliver, Jr., Professor and Chairman, Department of Pediatrics; University of Pittsburgh (Representing the Association of American Medical Colleges).

Honorable Paul N. McCloskey, Jr., (R–CA); Member of Congress.

Edwin V. W. Zschau, President; System Industries.

Ann Eskesen, Director, Small Business Resource Development Center, Bentley College; and Chair, Innovations Committee, Smaller Business Association of New England (also representing Small Business United).

Stanley Mason, President, Simco, Inc.; and Chairman, Emergency Committee to Enact the Small Business Innovation Research Act of 1981.

Arthur S. Obermayer, Vice President, American Association of Small Research Companies; President, Moleculon Research Corporation; and Member, NSF Advisory Council.

Randy Knapp, President, Chief Executive Officer and Chairman of the Board, WesperCorp (Representing the American Electronics Association).

A quorum being present, on March 9, 1982 the Full Committee on Science and Technology considered and ordered reported H.R. 4326 with amendments by unanimous voice vote.

III. Background

A. INTRODUCTION

There remains little doubt that small, high technology businesses have been very innovative and have brought to the marketplace new and different products and processes. They have contributed significantly to the Nation's economic growth. The recognition of the ability of the small firm to develop and commercialize new technologies, coupled with the apparently declining rate of innovation and productivity in U.S. industry as a whole, have led to widespread interest in the problems of the small business community and the amount of federal R&D funding which is flowing into this sector. The bill, H.R. 4326, the Small Business Innovation Development Act—and a similar bill in the Senate, S. 881—seek to address the issue of improving the innovative capabilities of small businesses through the establishment of Small Business Innovation Research (SBIR) programs within federal departments and agencies with R&D budgets over $100 million. Agency programs would be funded with a portion of the agency's R&D funds.

As reported by the Small Business Committee, agency small business innovation research programs are funded through a 3-percent mandatory set-aside of agency R&D funds, over $1 billion annually. The Senate counterpart bill, S. 881, requires a set-aside of 1 percent of an agency's extramural R&D funds. The Committee amendment endorses the 1-percent level as an agency goal for the funding of agency small business innovation research programs, but provides that actual funding levels be determined through the normal budget process.

The Committee held hearings on H.R. 4326 on January 26, 27, and 28, 1982. Various issues were raised during the course of this inquiry and they are addressed below. The Committee was concerned with the necessity and feasibility of federal-wide expansion of the SBIR program; what information exists regarding the role of small companies and the level of their participation in federal R&D; whether a set-aside is the optimum mechanism for stimulating small business innovation and increasing small business paticipation in federal R&D; and what type of program, if any, would be most effective. (References made in the following discussion relate to the Committee's hearings on H.R. 4326 unless otherwise noted.)

B. STATE OF SMALL BUSINESS PARTICIPATION IN FEDERAL R&D

Data concerning the small business share of Federal R&D

A purpose of the bill is to increase the utilization of small business in federal research and development. Some have argued that a set-aside of federal R&D funds for small business is justified on the basis that small firms have been demonstrably innovative, and yet

receive a small share of the federal R&D budget. During debate on the legislation, frequent references have been made to the small business share of federal R&D as 3.5 percent–4 percent (of a $40 billion federal R&D budget, fiscal year 1982).

Numerous doubts have been raised about the accuracy of the data. During the Committee's hearings, the GAO representative indicated that it is unclear whether the 3.5–4 percent figure is correct. Data made available from the Federal Procurement Data System (FPDS) indicate that in Fiscal Year 1980, small businesses received 24 percent of all federal R&D contracts over $10,000, comprising 6.8 percent of total federal R&D contract expenditures. These figures do not include grant or subcontract data, or contracts under $10,000, although the Small Business Administration estimates that small businesses receive approximately 60 percent of federal R&D contracts under $10,000.

One witness at the hearings, Dr. Edwin Zschau, suggested that the distribution of 6.8 percent of federal R&D contract funds to small firms may be commensurate with their capabilities. Zschau cited NSF data [3] which indicate that of the 643,000 R&D scientists and engineers (in full-time equivalents) in the U.S., 5.5 percent are employed in small companies.

Agencies defended their records of small business participation. Admiral Stuart Evans, Director of Procurement, NASA, described the space effort as a cooperative effort with industry, especially small business, and academia. Some 7,000 small businesses worked to make the Space Shuttle and its recent flight a reality.[4] In fiscal year 1981, small business participation in NASA's total procurements aggregated some $409 million or 9.6 percent of all prime contracts and some $475 million in subcontracts for a total of $884 million. This constitutes approximately 20 percent of total contract/subcontract awards to business firms. Of the 100 companies in fiscal year 1981 receiving the largest dollar value prime contracts, 24 were small business firms.

The absence of uniform data concerning the small business share of federal R&D precludes, for the current time, an accurate assessment of the level of small business participation in federal R&D. At the same time, however, the commonly cited figure of 3.5–4 percent appears to understate the amount of federal R&D dollars going to the small business sector.

Committee recommendation

The Committee is concerned about apparent gaps in the data concerning the small business share of federal R&D, and recommends that a policy decision concerning the necessity of a mandatory set-aside be reserved pending the analysis of more complete data. In this regard, the Committee is requesting the General Accounting Office to undertake a review of the small business share of federal research and development funding. For the present time, the Committee believes that small business participation in federal research and development will be facilitated to a significant degree by the establishment of small business innovation research pro-

[3] National Patterns of Science and Technology Resources 1981: NSF 81-311.
[4] Statement of Stuart J. Evans before the Committee on Small Business, September 22, 1981.

grams. The Committee amendment provides that 13 agencies will establish small business innovation research programs. Funding for agency SBIR programs will be provided through the normal budget process, although the legislation provides specific goals (1 percent of agency R&D funds) for the funding of agency SBIR programs, which is to be taken from existing agency funds.

The Committee believes, however, that the state of small business participation in federal R&D does not warrant, at this time, the use of what amounts to a new entitlement program, a set-aside of agency R&D funds as envisioned in H.R. 4326, as amended by the Small Business Committee.

C. BARRIERS TO SMALL BUSINESS PARTICIPATION IN FEDERAL R&D AND RECENT CONGRESSIONAL INITIATIVES

The legislation has been formulated, in part, on the basis of anecdotal evidence concerning the reluctance of federal departments and agencies to contract with small firms. During the Committee's hearings Senator Rudman testified that the difficulty small companies have in competing for federal funds results from, among other things, the "old boy network" of awarding grants within the bureaucracy and the reluctance of bureaucrats to "invest" in small companies because of uncertainties that such actions will produce results. He argued that ". . . the small business community has been frozen out of the federal research and development process by policies which do discriminate in favor of large companies and large universities."

The Committee posed the question to the SBA representative, who cited the "complex regulations, paperwork and regulatory barriers" as disincentives to small business involvement in federal R&D. Kenneth Chilton, Associate Director of the Center for the Study of American Business, alluded to the decline of the role of small firms in innovation as a consequence of federal policies during the 1970's (the "dark ages of public policy affecting small businesses") involving federal regulation, tax policy and direct government support.

The decade of the 1970's witnessed the enactment of 130 major federal acts that increased government control over business firms.

In 1979, firms with assets of less than $5 million had an effective tax rate of 41 percent on the average, while firms with assets over $1 billion paid at an average 29 percent rate.[5]

Recent Congressional attention has focused on policies which adversely affect small businesses. The 96th Congress enacted Public Law 96-517, which changed patent policy to allow small businesses (and universities) to retain title to patents conceived under federal research and development funding. Other recently enacted laws also contribute an improved climate for small business by lessening the regulatory burden imposed on small business firms.

The Regulatory Flexibility Act, Public Law 96-354, requires federal agencies to tailor regulatory requirements to the size of the firm, where possible. Public Law 96-511, the Paperwork Reduction

[5] Quarterly Financial Reports, FTC, as quoted in "Public Affairs Report," Institute of Governmental Studies, Vol. 21, Dec. 1980.

Act, will minimize the paperwork burden on the entrepreneur. The Equal Access to Justice Act, Public Law 96–481, enables small firms to recover costs incurred in specific types of legal actions involving the Federal Government. In addition, the President's recent Executive Order requiring OMB review of new regulations should further assist the small businessman in dealing with the federal bureaucracy. Another significant change occured in January 1982, when the Public Health Service, which includes the National Institutes of Health, removed its two-decade old restriction on for-profits eligibility for research grants. With this recent change, small businesses are eligible to compete for most federal extramural R&D funds.

Committee recommendation

The federal-wide expansion of the small business innovation research program should significantly enhance the opportunities for small business to participate in federal research and development. However, the Committee is concerned about the potential risks involved in expanding the NSF program which is funded at a level of $5 million annually to a federal-wide program funded through a mandatory set-aside (1 percent-3 percent) of agency R&D funds. Such a proposal contains the appropriations for the new untried program in addition to the new authorization establishing it. The Committee feels any potential financial risks will be alleviated by subjecting agency funds for SBIR programs to the normal Congressional review of authorizations and appropriations. Through this process the authorizing committees of Congress can ensure the most desirable and realistic level of funding for agency SBIR programs and their consistency with the priorities determined by the Congress through the normal budget process.

D. SMALL BUSINESS INNOVATION AND CAPITAL AVAILABILITY

The legislation is also intended to provide seed capital to small, high technology firms at the early, high risk stage of initial concept development. Funds provided under H.R. 4326 would compensate for what has been described as a lack of investment capital for small businesses. Ann Eskesen, Director of the Small Business Resource Development Center, Bentley College, estimated that a small firm must raise more than twice the capital from outside sources to support the same level of R&D effort as the larger corporation. The situation is currently compounded by high interest rates and tight credit. In his testimony Senator Rudman maintained that the ". . . decrease during the past two decades in equity capital availability to small, high risk companies for initial concept development has threatened the nation's technological preeminence." Funds provided under the SBIR program would be used, according to Congressman LaFalce, to cover early development costs for small firms, providing early risk capital which is necessary for the procurement of follow-up support from the private sector.

These assertions have been challenged. Dr. Kennedy noted in his testimony that in determining the availability of venture capital, current data must be utilized in light of recent tax law changes

which have had significant impact on the situation. Dr. Zschau, who four years ago presented data to the Congress to document the shortage of risk capital for small firms and to urge a reduction in the capital gains tax on the grounds that it would rekindle incentive to invest in young companies and new technologies, outlined recent changes in tax law and their "extraordinary" impact on funds available for small business. The Steiger amendment to the 1978 Tax Act which lowered the maximum capital gains tax rate from 49 percent to 28 percent has resulted in the current availability of about $5.8 billion for investment by private venture capital firms, SBICs and corporate investment subsidaries. The Economic Recovery Tax Act of 1981 also contains additional incentives to small, innovative firms, including a further reduction in the maximum capital gains tax rate to 20 percent.

Dr. Zschau presented data[6] to the Committee to display the changes in the financial conditions facing small young firms during the last decade. Table I illustrates the financial situation before and after the tax changes.

Numerous Members have been concerned about the willingness of the venture capital industry to invest seed capital at the early high-risk stage of start-up ventures. Dr. Zschau estimated that investments in start-ups have doubled since 1978. In 1978, 20 percent of investments of venture capital were start-ups, whereas in 1981, 40 percent, or 400 venture investments, were in brand new companies.

While not all small companies will be financed by the $5.8 billion in risk capital, many will be. However, these decisions will be made in the private sector, not by the Federal Government. Small businesses may prefer federal dollars because, as conceived under H.R. 4326, the award of funds would not require the payment of interest or the granting of equity in the company. Zschau warned, however, of the possibility of an overabundance of federal funds crowding out private capital. "That is, the private capital sources would not be able to make the investments because the investments would be made or the funding would come from federal sources. Private capital . . . wouldn't be able to make the investment because of the competition."

Zschau concluded:

> When you make these fundings of young companies and point to their successes, we relate that to the efficacy of the federal funding program. The fundamental question is whether or not it was necessary to spend taxpayers' money to make (a company's) success or whether it could have come from the private sector.

[6] Data collected and summarized by Stanley Pratt, Editor, Venture Capital Journal.

TABLE I.—ESTIMATED VENTURE CAPITAL FUNDING AND YOUNG COMPANY INVESTMENTS

[Millions of dollars]

	New private capital committed to venture capital firms	Investments made by venture capital firms in young companies	Funds raised by small companies [1] from public market
1969	171	450	1,367
1970	97	350	375
1971	95	410	551
1972	62	425	896
1973	56	450	160
1974	57	350	16
1975	10	250	16
1976	50	300	145
1977	39	400	43
1978	570	550	89
1979	[2] 319	1,000	183
1980	900	1,000	820
1981	1,250	1,200	1,760

[1] "Small Companies" defined to be those with a net worth of $5 million or less.
[2] The slowdown in funding in 1979 was caused by the Labor Department's Planned Asset Rule which discouraged pension funds from making venture capital investments. This was changed in 1980.

Committee recommendation

The committee intends that funds provided through agency SBIR programs supplement, but not supplant, private capital. The committee recognizes that recent changes in tax law have had a substantial impact on the availability of venture capital. In particular, the committee is interested in monitoring these effects and their influence on the availability of risk capital for early stage, high risk ventures. Consequently, the committee believes that a careful approach to federal-wide expansion and funding of agency SBIR programs is desirable. The committee amendment provides for this through regular authorization of agency SBIR programs, which will enable the Congress to respond effectively to future capital fluctuations and trends, and their effect on a federal-wide SBIR program.

E. BRIEF HISTORY OF THE NSF SMALL BUSINESS INNOVATION RESEARCH (SBIR) PROGRAM

NSF's Small Business Innovation Research Program was initiated in 1977 to stimulate high quality proposals from small science and technology firms in NSF program areas. At the time, NSF was required to expend 10 percent of its applied research budget to small businesses. (The first set-aside of 7½ percent of applied research funds was imposed in 1975.) The program structure or other steps taken by NSF for the program's implementation were not specified by the Congress.

The NSF program operates in three phases, as follows: Phase I supports research proposals with awards of up to $30,000 for six months on important scientific or engineering problems or opportunities of interest to NSF. Those projects found most promising after Phase I receive Phase II awards, which have averaged $200,000 for 1–2 years. This is the principal research project. Phase III involves commercial applications where possible from the NSF research

supported in Phases I and II. Phase III is funded entirely with private capital.

In addition to the SBIR program supporting advanced research in a wide range of program areas, the 21 Phase II grantees in the 1977 solicitation have received $46 million in follow-on funding to date, directly or in part a result of the SBIR awards. These 21 firms also have more than doubled their employment. NSF funding in Phases I and II of the 1977 solicitation totaled $5.3 million. There have been new firms started as a result of the program and some 15 inventions reported. A number of new products and processes are under development and one is now being marketed. An increasing number of industrial and venture capital firms are showing interest in the program as the SBIR topics have become more industrially oriented.

Proposers are encouraged to cooperate with university researchers such as through consulting arrangements, subcontracts and the use of special facilities on occasion. Most grantees have done so, particularly in utilizing university scientists and engineers as consultants.

NSF's $5 million program has shown great promise and the Committee, through annual authorization of the NSF, has consistently lauded its successes. At the same time, however, the Science and Technology Committee in previous years [7] recommended the elimination of the set-aside as both unnecessary and undesirable. The NSF SBIR program operates currently without a set-aside.

IV. Issues Involved in H.R. 4326

A. FEDERAL-WIDE EXPANSION OF THE SBIR PROGRAM

H.R. 4326, as reported by the House Small Business Committee, requires all agencies with research and development budgets over $100 million to establish SBIR programs. A similar program, the Defense Small Business Advanced Technology Program, was initiated by the DOD less than 2 years ago without any legislative requirement. The GAO witness testified that the program framework is sufficiently flexible to allow agencies to design SBIR programs that could address conditions important in fostering small business innovation.

A slower, phased-in approach like that of S. 881 which impacts fewer agencies than the House bill, is preferred by the Administration. Administration witnesses expressed concern over the program design and questioned its potential application and contribution to the mission agencies. NSF is a non-mission agency responsible for the promotion and advancement of scientific progress in the U.S., and funds research in all fields of science and engineering. Conversely, the majority of the departments and agencies covered under the House bill, as reported by the House Small Business Committee, have clearly defined missions. Concern was expressed over the three-phase program structure as not taking into account distinctions among mission agencies which expend R&D dollars or the manner in which they are spent.

---

[7] See H. Rept. 95-98, Authorizing Appropriations to the National Science Foundation; H. Rept. 95-993, Authorizing Appropriations to the National Science Foundation.

Dr. Langenberg noted that the National Science Foundation developed an SBIR program which was specifically designed to meet the organization's operational style and mission. The NSF also views the program as experimental in nature. The authorizations which mandated the effort never specified a program structure or implementation mechanism. It is, therefore, not necessarily optimal to copy the NSF system. Each of the departments' witnesses indicated that an SBIR program could be developed more consistent with the agency needs.

Dr. Tribus also questioned the hypothesis that the NSF program would be a good model for the other agencies. He and Mr. Chilton agreed that the requirements to conform to the Foundation's program organization are too bureaucratic and would cause waste and inefficiency. The government can learn from the NSF effort, but it should not be assumed that all is known regarding this type of activity. As Dr. Kennedy argued, the NSF program is too new to determine accurately its impact on research and the benefits to be derived from this effort.

The lack of flexibility of approach is a problem because, in Dr. Marston's words, ". . . it lumps together within a single mechanism very, very dissimilar activities of the Federal Government." In order to compensate for this, the Association of American Universities, the National Association of State Universities and Land Grant Colleges, and the Association of American Medical Colleges suggest that the bill be revised so that the authorizing committees of the Congress have control over the development of the program and funding within the relevant departments and agencies. This approach was also suggested by the General Accounting Office.

Committee recommendation

The committee endorses the federal-wide expansion of the SBIR program. The committee recognizes that the program should be structured in a manner which will reflect the inherent differences in agency missions and responsibilities. To the extent that agencies must diverge from the program parameters contained in the legislation, the committee feels that changes can be addressed through the regular authorization process.

This mechanism will allow the other departments the flexibility (which is afforded to the NSF and DOD) to develop a program which meets the agencies' missions and operating styles. Congressional legislative oversight will ensure that the SBIR effort is implemented, but in a manner which reflects the organizational realities within the federal departments and agencies.

B. THE SBIR SET-ASIDE

H.R. 4326, as reported by the Small Business Committee, requires that agencies set aside 3 percent of their research and development funds to support agency SBIR programs. The set-aside provision would be phased-in over a four year period.

The Congressional Budget Office estimates [8] the amounts of a 3 percent set-aside phased in over 4 years for SBIR programs as follows:

	Millions
Estimated R. & D. obligations:[1]	
Fiscal year:	
1982	$40,300
1983	44,100
1984	47,700
1985	51,600
1986	55,500
Estimated set-aside:	
Fiscal year:	
1982	200
1983	440
1984	955
1985	1,545
1986	1,665

[1] Includes funds for only those agencies that would be required to establish an SBIR program.

During the hearings, serious doubts were raised by Members and witnesses concerning the use of the set-aside mechanism, the amount of the set-aside, the impact of a set-aside on the allocation of funds for basic research as well as for applied research and development, and the effect on the operation and mission responsibilities of the agencies. Dr. Prager acknowledged that the Administration is not enthusiastic about the set-aside concept, and Senator Rudman testified to his reservations that set-aside programs ". . . have been a disaster in many cases (and) have resulted in wasted money." However, he strongly believes that they are needed for helping small business.

Others feel that a set-aside program is necessary in order to force federal departments to allocate their R&D money to small businesses. NIH and DOE were identified as agencies which expressed interest in increasing small firm participation in federal R&D funding, but which year after year, "failed" to do so. Even at the National Science Foundation, Dr. Obermayer argued, the SBIR program would never have been implemented or continued without a Congressionally mandated set-aside program. Despite opposition from the Foundation, NSF developed an effective mechanism to respond to the problem when forced to do so by the Congress, he explained.

1. Policy implications of the set-aside

A set-aside program may have unintended side effects which impact negatively on the economy. The argument was offered by Mr. Chilton that set-asides have a ". . . detrimental effect on the normal market for federal research—that is, it interferes with the normal efficiency of the marketplace." Set-asides do not necessarily address more than one of several possible causes for the underutilization of small business and are ". . . unlikely to produce large incremental benefits over and above those created by a Congressional mandate for SBIR programs without specific funding quotas."

The set-aside reappropriates funds by taking money from one area for which funds have been authorized and appropriated by the

[8] H. Rept. 97-349, Pt. 1. Small Business Innovation, Report of the Committee on Small Business to accompany H.R. 4326.

Congress and shifting it into another, based upon the decisions of SBIR program managers within the departments and agencies. Similarly, because of the overall differences between basic research and development undertaken within the small business sector, Dr. Kennedy argued that H.R. 4326, in effect, would result in a reallocation of federal funds to support a different set of research purposes than currently exists in many federal program areas. This would occur outside of, and in spite of, the regular budget process, which typically determines the disposition of funds and the allocation of priorities among competing programs.

The set-aside mechanism can also distort and confuse the traditional functions of the government vis-a-vis the private marketplace. The government is not in the business of commercializing products, but rather supports research and development designed to meet a specific mission responsibility of an agency or which serves a public good but which would not otherwise be undertaken by the private sector. It is the business community which has the responsibility and ability to assess the marketplace and the expertise to determine which ideas can be successfully commercialized. Thus, to avoid the detrimental impacts of a set-aside program, yet compensate for what is viewed as the underutilization of the small business sector, it was suggested that traditional governmental mechanisms for assistance to the private sector be implemented. Mr. Chilton noted that small firms would be better served by removing barriers to competition and that the tax and regulatory reform measures recently enacted will have a positive effect. The American Electronics Association also encouraged the Committee to look at alternatives, recommending tax-based incentives for technological achievement as more effective than direct federal spending in promoting innovation. Similarly, Dr. Oliver argued that changes in several laws, particularly those related to patent rights and Public Health Service grant eligibility, will encourage small business participation in the competition for federal R&D dollars.

2. Impact on basic research

Another issue explored at the hearings involved the potential impact of the set-aside on the basic research efforts of the Federal Government. Dr. Tribus pointed out that H.R. 4326, as reported by the House Small Business Committee, treats research and development the same, although they are characterized by different activities. The purpose of this legislation is not to promote new and better research, but rather to develop and apply new products and processes and to create new jobs. Similarly, Dr. Kennedy articulated the differences between basic research—70 percent of which is performed at universities—and the applied and developmental aspects of commercialization which small businesses generally undertake. He testified that there is ". . . almost no overlap between research of the kind generally supported by federal funds and innovation as it characteristically takes place in the most creative and productive small business environments." It is thus doubtful that the small business sector could perform, in lieu of the universities, this basic research, for, according to Dr. Kennedy, ". . . the vast majority of the work now supported by the funds of the various re-

search agencies of government is not duplicated in the small business sector."

Concern over the impact of a set-aside on basic research funds appears to be justified. About 70 percent of the funds for basic research are provided by the Federal Government, which has assumed responsibility for supporting basic science as a means of producing the knowledge base for future technological and economic growth and assuring that fundamental research is conducted in areas related to its own as well as to national needs. Through federal support, the nation can continue to maintain strong capabilities in critical areas such as national defense and health. Strong federal involvement also occurs because the economic gains from pure science are frequently long term and do not necessarily benefit the sponsor of the research for many years, if ever. Consequently, because the industrial sector primarily stresses relatively short-term returns on its investments, it tends to place less emphasis on basic research and allocates most of its resources in more applied areas and in development. Universities cannot place large amounts of their own funds in basic research because of limited financial resources.[9]

Some measure of industry performance of basic research is provided by share of publication. Publication in technical journals is a standard means to lay claim to the results of efforts, and thus, counts of industry-generated publications can serve as indicators of the amount of successful research, in terms of meeting the standards of refereed journals, being done in the industry sector, at least in those areas that companies consider suitable for public disclosure. Industry's share of all journal articles written by Americans was 9 percent in 1979. Industry published 36 percent of U.S. engineering and technology articles in 1979; 16 percent of the chemistry articles and 15 percent of the physics articles. On the other hand, industry published only 3 percent of the nation's research articles in clinical medicine, biomedicine, biology, and mathematics.[10]

The utilization of set-asides would cause, in Dr. Oliver's estimation, the diversion of funds ". . . from the creation of new knowledge, the long-term wellspring of all innovation, to the short-term exploitation of the existing, finite and exhaustible storehouse of current knowledge to produce practical goods and services." Dr. Marston concurred with the assessment of basic research as the foundation of all applied research. "All sectors of American society recognize the great significance of fundamental research in the sciences and the need to maintain this research for future strength of the nation's economy, national security, and general well-being." Typically, a large portion of federal R&D funds is committed in advance for continuing large scale projects, for instance, the Space Shuttle. In fact, the major portion of Federal R&D is concentrated in the development process. A report of the distribution of federal R&D obligations compiled by the National Science Foundation[11]

---

[9] Science Indicator—1980, Annual Report of the National Science Board.

[10] Ibid.

[11] Federal Funds for Research and Development: fiscal years 1980, 1981 and 1982; National Science Foundation; NSF 81-325.

reflects the following concentration of federal R&D dollars in basic, applied and development activities: Basic Research—13.7 percent; Applied Research—19.7 percent; Development—66.7 percent. Since there is a previous commitment for much of these development funds, the set-aside provision could cause a greater than anticipated share of funding to be taken from the basic research category in order to fulfill the set-aside requirement.

The Administration acknowledged that the amount of the set-aside which could be drawn from basic research funding should be limited, as in the Schmitt amendment to S. 881. This provision mandates that the set-aside cannot utilize more than 1 percent of the money appropriated for basic research. This is in recognition of the fact that in most departments and agencies the major portion of the R&D funding is committed to on-going programs and the remaining funds generally consist of extramural dollars for basic research which would be most vulnerable for use as the set-aside. However, the General Accounting Office offered an alternative to the limitation as contained in S. 881. It suggested that the issue of basic research could best be addressed through the traditional budget process. Mr. Myers elaborated:

> If concern is with unintended effects of the SBIR programs on funding for basic research, maximum flexibility and control over funds taken from basic research to support SBIRs can be best achieved by funding SBIRs through the normal authorizations and appropriations process rather than by limiting the amount of the set-aside as this provision would do.

Committee recommendation

The committee concludes that any benefits to be realized through the federal-wide expansion of the small business innovation research program would be short-lived if achieved at the expense of the nation's basic research. The committee is concerned, however, that agency basic research funds may be vulnerable to disproportionate reductions to provide funds necessary to support agency small business innovation research (SBIR) programs. To ensure that this does not occur, the committee recommends that special precautions be taken to protect agency basic research funds. The committee amendment provides for this protection in two ways. First, the committee recommends the placement of a limitation of 1 percent on the portion of an agency's basic research funds which can be utilized for the support of an agency's SBIR program. The committee recognizes that the protection afforded to agency basic research funds through this mechanism will be limited. Consequently, the committee amendment provides that funds reserved for agency SBIR programs be authorized under the normal budget process. Through this process, the Congress can ensure that funding of agency SBIR programs is achieved consistent with Congressional intent and without detrimental impact on the nation's basic research effort.

3. Amount of the set-aside

With these issues and others taken into consideration, the 3 percent set-aside as mandated in the language of H.R. 4326, as referred to the committee, generally is viewed as too large. The Reagan Administration is supporting the smaller 1 percent, or $400 million, set-aside amount in S. 881, acknowledging that the National Science Foundation's SBIR program is still experimental and a smaller, phased-in set-aside activity would allow for an assessment of the effectiveness of the effort. As Senator Rudman pointed out, the $1.67 billion which the House bill would generate is too much for the small business community to absorb in three years; if the 1 percent mandated in S. 881 proves inadequate, it always could be increased.

Witnesses from several agencies testified that the set-aside mechanism would cause some problems in actual operation. The NASA representative stated that, because of the absence of flexibility in the 3 percent set-aside requirement, the actual amount that NASA would have to expend under H.R. 4326 would be 32 percent of all uncommitted funds. Admiral Evans elaborated:

> In spite of our past accomplishments, we have no concrete evidence, at this time, of the ability of that segment of small business that conducts R&D to increase its capacity or expand its base sufficiently to accomplish an SBIR program of the magnitude contemplated under H.R. 4326.

Mr. Kirschenmann from HHS indicated that the department's experience has shown ". . . a relative paucity of small businesses which possess biomedical research capabilities especially in the basic science area." Thus, HHS likely would be unable to dispense the large amount of funds which the 3 percent would represent. For similar reasons, the Administration supports the exclusion of intramural R. & D. from determinations of the set-aside because, in Dr. Prager's words, it is unlikely that substantive amounts of intramural research can be shifted to small business: "it is the nature of these in-house programs that they are dedicated to the conduct of R. & D. not ordinarily conducted by other R. & D. performers."

Dr. Langenberg of NSF described that under the 3 percent set-aside "it is questionable that the quality of the research could be maintained. The set-aside might also threaten the continuation of on-going research projects." Langenberg explained:

> NSF foresees that a need to set-aside sufficient amounts of funds would result in significant reductions in research support to presently highly productive researchers. . . . at 3 percent the amounts required would have potentially serious consequences since it is unrealistic to expect to find small business research capabilities and interest reasonably evenly distributed over the scientific and engineering disciplines supported by NSF.

Evans summarized the pitfalls of a mandatory set-aside:

> If R. & D. agencies become bound by statute to set aside a fixed percentage of their budgets for an SBIR program and if the small business community cannot produce suffi-

cient legitimate and fruitful ideas to merit awards, the agencies may either have to spend money on marginal projects to meet a legislative set-aside or witness the loss of funds since the legislation appears to leave no discretion in this matter. In those instances where an agency was unable to meet its SBIR set-asides, criticism could be directed not at the quality of an agency's grant or contract awards but rather toward the failure of the agency to expend all the money required by a legislative mandate. Furthermore, whenever a "spend or lose" concept is embodied in legislation involving appropriations, the potential for improvident or marginal obligations can be increased.

Committee recommendation

The Committee believes that the Congress should seriously consider the policy implications which are raised by the proposed set-aside mechanism. Primarily, the Committee is concerned that the effect of the set-aside is to establish actual appropriations for a new program by skirting the normal budget process, potentially altering spending priorities and funding for programs and projects which are determined by Congress in authorizations and appropriations.

The Committee is not convinced that a mandatory set-aside of agency R&D funds is necessary for start-up of a federal-wide program. Nor is the set-aside the optimum approach to the funding of agency small business innovation research programs, for several reasons. The first concerns the experimental nature of the National Science Foundation's Small Business Innovation Research program. The second concerns the lack of evidence that there are enough small high technology firms capable of performing the high quality research to absorb the amount of funds which would be made available under the set-aside requirement.

The Committee's amendment specifically addresses these concerns, by requiring regular Congressional review of programmatic and funding requirements of a federal-wide SBIR program. The Committee believes that this regular review, which will be provided through the normal authorization and appropriations process, is essential to ensure the success of a federal-wide program.

The Committee strongly recommends against a mandatory set-aside of the federal R&D budget. Not only is the set-aside unwise public policy; it is neither a desirable nor a necessary mechanism to implement a federal-wide SBIR program.

C. PEER REVIEW

Most broadly speaking a "peer review system" is any method of evaluating a specialized creation—such as a proposal to perform scientific research—which involves having a group of people knowledgeable in the area of specialization evaluate the creation. The experts are called "peers," the term loosely deriving from the relationship between the proposer and the evaluators. In science the chief uses of peer review are to help determine whether a proposed piece of work or study should be funded or to help determine whether an existing scientific paper should be published. Peer

review is used for these purposes because it is believed to be the best practical method of identifying excellence.[12]

The peer review process, as utilized at the National Science Foundation, is offered as the mechanism to assure the quality and integrity of the agency SBIR programs. H.R. 4326, as reported by the House Small Business Committee, requires the use of peer review "for at least phase two proposals," while S. 881 requires the use of peer review, "as appropriate." This type of review system will ensure that this small business set-aside program will be successful in contrast to other set-aside programs because, in Senator Rudman's opinion, the bureaucrats will not be making the decisions. It is believed this will result in money being allocated on an "achievement" basis.

While the peer review system may work within the NSF, questions were raised as to its appropriateness in a market situation. The Federal Government, by law and tradition, does not have experience in commercialization and marketing. Thus, how, without this expertise, can the agencies make selections between proposals and make an allocation of funds based upon the decision of what will be successful in the marketplace? This is not the role of the Federal Government, Congressman Brown pointed out, but rather that of the private sector. Similarly, Dr. Tribus criticized the likely effectiveness of using peer review within a competitive, market-oriented situation. He testified that ". . . peer review for development, particularly on innovative development, never makes sense." The issue becomes one of who will perform the review—can a competitor be relied on or must the Government make a decision despite an unfamiliarity with the marketplace.

Witnesses agreed that language contained in S. 881, i.e., providing for agency peer review "as appropriate," provides greater flexibility since the imposition of unfamiliar research review methods could cause serious management problems for some agencies and possibly small businesses as well.

Committee recommendation

The Committee feels that decisions concerning the utilization of the peer review process for evaluation of agency SBIR proposals be made by the agency required to have an SBIR program. There appears to be little rationale for requiring agencies to depart from the methods and procedures which have evolved in various agencies consistent with their research purposes and organizational structures. Thus, whether to use peer review is best determined by the agency in structuring its SBIR program.

D. LEAD AGENCY

1. Program oversight

The Committee amendment assigns program oversight responsibility to the Office of Science and Technology Policy. Under the Committee's amendment, the Small Business Administration will

[12] "National Science Foundation Peer Review," Report of the Subcommittee on Science, Research and Technology of the Committee on Science and Technology; 94th Congress, 2nd Session, January 1976.

be involved in the coordination of agency programs and will be responsible for disseminating information concerning agency SBIR programs to small business concerns. A policy role for the SBA, however, has been eliminated.

2. Policy directives

The Committee's hearings revealed widespread agreement that the SBA does not have the resources or the experience to serve as the lead agency for the development and administration of policy as mandated in the House bill. According to Dr. Prager, the Small Business Administration properly acts as an advocate for small companies but "it has neither the mandate nor expertise necessary to perform the role envisioned of it" in H.R. 4326. Providing this lead responsibility to OSTP alleviates the overlap and duplicative effects of requiring the involvement of both SBA and OSTP.

Administration witnesses recommended that responsibility for issuing relevant policy directives be assigned to the Office of Federal Procurement Policy, given the organization's experience in this activity.

Committee recommendation

The amendment contains explicit guidelines for agencies to follow in the structuring of SBIR programs. As a result, the Committee feels that a central Executive agency role other than that envisioned for the Office of Science and Technology Policy, is unnecessary. The Committee notes that the National Science Foundation's SBIR program and the DOD Small Business Advanced Technology (SBAT) program, although similar, have operated effectively without the additional involvement of SBA or another agency. The Committee believes that autonomy of agency programs is an important feature of the amendment, and one which will enhance the efficiency and effectiveness of agency SBIR programs. The Committee does not expect this change will diminish in any way the ability of small business concerns to participate in agency SBIR programs. SBA will continue to be involved in the coordination of agency programs, including dissemination of information to small business concerns. Providing agencies the autonomy to run the SBIR programs is also expected to result in reduced administrative costs.

V. Section-by-Section Analysis

Section 1: Short Title.

Section 1 provides that this Act may be cited as the "Small Business Innovation Development Act".

Section 2: Findings and Purpose.

Section 2 sets forth Congressional findings and states the purposes of the Act.

Section 3: Responsibilities of the SBA Administrator.

Section 3 amends Section 9(b) of the Small Business Act and requires Small Business Administration:

(1) to develop and maintain a source file and an information program to assure each qualified and interested small business

concern the opportunity to participate in federal agency small business innovation research programs,

(2) to coordinate with participating agencies a schedule for release of SBIR solicitations, and to prepare a master release schedule so as to maximize small businesses' opportunities to respond to solicitations,

(3) to report annually to the Office of Science and Technology Policy on the SBIR program responsibilities assigned to it under this Act and,

(4) to report not less than annually to the Senate and the House of Representatives on the SBIR programs of the Federal agencies and the Administration's responsibilities related to the SBIR programs.

Section 4: The Committee's intent in item (2) is not that the SBA would be able to dictate a schedule of solicitations, but rather that SBA would consult with the agencies and suggest solicitation dates. The agencies would be free to take these suggestions or not, and the master schedule would be based on agency decisions.

Section 4 further amends Section 9 of the Small Business Act by adding at the end thereof the following new subsections:

Subsection (e): Definitions. This subsection defines the operative terms.

(1) the term "federal agency" is defined in a way that differs from that used for other SBA programs. This definition is intended to broaden the definition of "agency" so that interpretations are consistent with Section 105 of Title 5 of the United States Code, or a military department as defined in Section 102 of Title 5.

(2) the term "funding agreement" means any contract, grant or cooperative agreement entered into between any Federal agency and any small business for the performance of work which is funded by the Federal Government.

(3) the term "small business innovation research program" or "SBIR program" means a competitive program designed to involve small businesses in meeting Federal research and development objectives and to promote innovation through a uniform process which may consist of three phases—

(a) a first phase for determining the scientific and technical merit and feasibility of proposals,

(b) a second phase to further develop the proposals to meet particular program needs and,

(c) a third phase, when appropriate, in which commercial applications of the research and development are pursued with private capital or in which contracts are made with a Federal agency for products or processes intended to benefit the United States government and,

(4) the term "research or research and development" is defined by adopting the definition contained in the Office of Management and Budget Circular A–11, Section 44.

Subsection (f): SBIR Program Funding Requirements.

Subsection (f) requires each Federal agency which has total appropriations in excess of $100 million for research and development for a fiscal year thereafter to establish a SBIR program. Each Federal agency which is required to establish a SBIR program shall reserve a specified amount contained in the section to meet the re-

91-424 O - 82 - 2

quirements of the SBIR program to the extent required in Acts authorizing appropriations for each agency. The percentage is based on requirements for program start-up: (1) The first year for which the program is operative, the agency reserves appropriations of not less than 0.2 per centum of its total appropriation for research or research and development, (2) the second year for which the program is operative, the agency reserves appropriations of not less than 0.6 per centum of the total appropriation, and (3) in all subsequent fiscal years for which the program is operative, the agency reserves appropriations of not less than 1 per centum of such total appropriations for R or R&D. The funds for each agency to carry out the program will be provided to the extent required in Acts authorizing appropriations for each agency.

Subsection (g): Ceiling on Basic Research Funds.

Subsection (g) contains language which sets a ceiling on the amount of funds available for the SBIR program from those obligations which have been provided from appropriations for basic research for each agency. Therefore, for the first fiscal year in which the program is authorized, the amount available for obligation for the SBIR program cannot contain an amount from the basic research funding which exceeds 0.2 per centum of such portion of the budget, for the second fiscal year such portion is limited to 0.6 per centum of the obligations for basic research and for the third year and succeeding years such portion is limited to 1 per centum of such obligations.

Subsection (h): Agency Responsibilities in Establishing SBIR Programs.

Subsection (h) sets forth the responsibilities for each Federal agency which is required to establish a Small Business Innovation Research program to:

(1) unilaterally determine categories of projects to be in its SBIR program,

(2) issue small business innovation research solicitations in accordance with a schedule determined cooperatively with the Small Business Administration,

(3) unilaterally receive and evaluate proposals resulting from SBIR program solicitations,

(4) unilaterally select awardees for its SBIR funding agreements,

(5) administer SBIR funding agreements,

(6) make payments to recipients of SBIR funding agreements on the basis of progress toward or completion of the funding agreement requirements; and

(7) make an annual report on the SBIR program to the Small Business Administration and the Office of Science and Technology Policy.

Subsection (i): Goals for R&D Funding with Small Business.

Subsection (i) requires that each Federal agency which has a total appropriation in excess of $20 million for research or research and development for fiscal year 1983 or any fiscal year thereafter shall establish goals for funding agreements for research or research and development with small business concerns. Each year's goals are intended to be a realistic assessment of what is possible

for the agency to establish for its funding agreements with small business.

Subsection (j): Reports on SBIR Program Awards.

Subsection (j) requires each Federal agency which is required to establish an SBIR program or to establish goals under this Act to report annually to the SBA on a number of awards pursuant to funding agreements over $10,000 in amount and the dollar value of all such awards. The report is to include a comparison of the number and amount of such awards to small business with awards to other than small business concerns.

Subsection (k): SBIR Program Policy Guidelines.

Subsection (k) requires each Federal agency in addition to responsiblities contained in subsection (h), to establish procedures for—

(1) simplified, standardized and timely SBIR solicitations,

(2) a simplified, standardized funding process which provides for:

(a) the timely receipt and review of proposals;

(b) outside peer review, as appropriate;

(c) protection of proprietary information provided in proposals;

(d) selection of awardees;

(e) retention of rights in data generated in the performance of the contract by the small business concern;

(f) transfer of title of property provided by the agency to the small business concern if such a transfer would be more cost effective than recovery of the property by the agency;

(g) cost sharing; and

(h) cost principle and payment schedules.

This Subsection provides that each agency will operate its own SBIR program, subject to the policy guidelines contained in the Act and subject to general program oversight by the OSTP. The Subsection specifically provides for peer review as appropriate, which will allow each agency with an SBIR program to continue its existing review mechanisms. Agencies concerned with classification of information will develop appropriate procedures for dealing with such information under the existing statutes.

Subsection (l): OSTP Program Oversight.

This Subsection requires that the Director of OSTP, in consultation with the Federal Coordinating Council for Science, Engineering and Technology, will independently survey and monitor all phases of the SBIR program required under this Act. This requirement includes compliance with the expenditure of funds which have been reserved for expenditure in acts authorizing appropriations for each such agency with small business concerns under Subsection (f).

Section 5: Report of the Comptroller General.

Section 5 requires the Comptroller General to report to the Senate and the House of Representatives not later than five years after the enactment of this Act on the quality, quantity and nature of research which is conducted under the amendments made by this Act, the Small Business Innovation Development Act, and the effect the amendments made by such Act have had on the Federal

agencies' research and development programs, together with such recommendations as the Comptroller General may deem appropriate.

VI. Impact on Inflation

In accordance with Clause 2(l)(4), Rule XI of the Rules of the House of Representatives, the following statement is made concerning the inflationary impact of H.R. 4326.

H.R. 4326 is assessed to have no inflationary effect on prices and costs in the operation of the national economy.

VII. Committee Oversight Findings and Recommendations

Pursuant to Clause 2(l)(3), Rule XI of the Rules of the House of Representatives, and under the authority of Clause 2(b)(1) and Clause 3(f), Rule X, the Committee's oversight findings and conclusions are reflected in the recommendations found in the present bill and report.

VIII. Summary of Government Operations Committee Findings and Recommendations

Pursuant to Clause 2(b)(2), Rule X, and Clause 2(l)(3), Rule XI of the Rules of the House of Representatives, no findings or recommendations have been submitted by the Committee on Government Operations for inclusion in this report.

IX. Budget Analysis and Projection

H.R. 4564 provides no new budget authority or tax expenditures. Consequently, the provisions of Section 308(a) of the Congressional Budget Act are not applicable.

X. Congressional Budget Office Cost Estimate

U.S. Congress,
Congressional Budget Office,
Washington, D.C., March 12, 1982.

Hon. Don Fuqua,
Chairman, Committee on Science and Technology,
House of Representatives, Washington, D.C.

Dear Mr. Chairman: Pursuant to section 403 of the Congressional Budget Act of 1974, the Congressional Budget Office has prepared the attached cost estimate for H.R. 4326, the Small Business Innovation Development Act of 1981.

Should the Committee so desire, we would be pleased to provide further details on this estimate.

Sincerely,

Alice M. Rivlin, *Director.*

Congressional Budget Office—Cost Estimate

March 12, 1982.

1. Bill number: H.R. 4326.
2. Bill title: Small Business Innovation Development Act of 1981.

3. Bill status: As ordered reported by the House Committee on Science and Technology, March 9, 1982.

4. Bill purpose: H.R. 4326 would allow, but not require, the authorization of appropriations for Small Business Innovation Research Programs (SBIR) by several major departments and agencies beginning in fiscal year 1983. The SBIR programs would target specified amounts of research and development (R&D) funds to small businesses. Each federal agency whose R&D appropriation exceeds $100 million annually would be required to allocate a percentage of its R&D budget for the SBIR program, if specifically authorized to do so. (The bill places a 1 percent ceiling on the amount of an agency's basic research funds which can be diverted for this purpose). The SBIR set-aside would be phased in over a three-year period, with a 0.2 percent allocation required in the first fiscal year in which it is authorized to establish an SBIR program; 0.6 percent in the next fiscal year, and 1.0 percent in each year thereafter. In addition, each federal agency with an R&D appropriation exceeding $20 million would be required to set goals for allocation of funding agreements to small businesses.

As provided in H.R. 4326, the Small Business Administration (SBA) would have responsibility for publicizing and coordinating a release schedule for SBIR solicitations and for preparing an annual report to the Congress on the status of the SBIR programs. The Office of Science and Technology Policy would be responsible for monitoring and oversight. The Comptroller General would review the quality, quantity and nature of the SBIR research activity within five years after date of enactment.

5. Cost estimate: Since H.R. 4326 does not authorize the appropriation of funds for the activities required in this bill, the creation of SBIR programs would require future authorization action. The following table shows the estimated cost impact if all federal departments and agencies eligible for SBIR programs are authorized to and do in fact establish such programs.

[By fiscal years, in millions of dollars]

	1983	1984	1985	1986	1987
Estimated authorization level	5	10	16	17	18
Estimated outlays	2	9	15	16	17

Portions of the cost of this bill would fall within nearly all the budget functions.

6. Basis of estimate: Shown below is a projection of the federal R&D budget through 1987, based on the current 1982 funding level as well as the estimated set-aside for the SBIR programs. While this version of H.R. 4326 specifies that the level of R&D appropriations, rather than obligations, should be used to determine eligibility for the SBIR program, specific data are not currently available regarding 1982 appropriation levels for federal R&D. While not identical, the obligation level is a reasonable approximation of the appropriation level, and therefore is used for purposes of this cost estimate.

[By fiscal years, in millions of dollars]

	1983	1984	1985	1986	1987
Estimated R&D obligations [1]	41,800	42,900	44,800	45,900	47,600
Estimated set-aside	85	250	450	460	475

[1] Includes funds for only those agencies eligible to be authorized to establish an SBIR program.

The total estimated R&D budget is based on estimates for those agencies that currently would be eligible to establish an SBIR program, including the Defense Department-military functions; the National Aeronautics and Space Administration; the National Science Foundation; and the Departments of Health and Human Services, Agriculture, Energy, Interior, Transportation, and Commerce. It also includes R&D estimates for the Environmental Protection Agency, the Nuclear Regulatory Commission, the Veterans Administration, and the Agency for International Development.

For purposes of this estimate the current 1982 funding level was assumed as a base. 1983 through 1987 R&D obligations were projected on a current policy basis, using defense and nondefense inflators consistent with CBO's current economic assumptions. The estimated set-aside for the SBIR programs was based on the formula specified in the bill.

Assuming a date of enactment on or around the beginning of May 1, 1982, it is assumed that each agency would be authorized and begin to establish procedures for the conduct of an SBIR program, beginning in fiscal year 1983.

Since guidelines of the SBIR programs are not specified in the bill, but rather would be developed following enactment, it is not totally clear at this time how each SBIR program would operate within each agency. Based on information supplied by the agencies, it was assumed that most agencies would develop programs similar to that currently operated by the National Science Foundation.

Assuming this model, each agency would establish a separate SBIR office, with responsibility for coordination and implementation of the SBIR activities. This staff would work with agency personnel to determine the appropriate R&D categories for solicitations, develop and coordinate with SBA the release schedules, and report annually to SBA on the status of the program. In addition, agency personnel would be required to receive and evaluate proposals, select recipients, and administer funding agreements—which would involve conducting negotiations, awarding contracts, making payments based on contract progress, and monitoring and tracking the program records. It was also assumed that agencies would need to reprogram their current tracking systems over the next two years, since the data necessary for the bill's reporting requirements are not uniformly available.

Based on these assumptions, it is estimated that the total outlays in those agencies required by the bill to establish an SBIR program would be approximately $2 million in fiscal year 1983, $8 million in fiscal year 1984, $15 million in fiscal year 1985, and $16 million in fiscal year 1986, and $17 million in 1987. These costs, although not authorized by the bill, represent the incremental costs to the agencies to implement an SBIR program. They assume that each year

an additional phase will be operational, so that by fiscal year 1985 all three phases of the SBIR program would be established.

It is very difficult to precisely measure the incremental costs at this time, however. The number and size of the awards, relative to current law, have a significant effect upon the administrative costs of the bill. For example, if under current law, an agency would have awarded one $5 million contract, but as a result of H.R. 4326 would now award 100 contracts for $50,000 each, additional resources would be required to manage and monitor these additional contracts. It is expected that guidelines will be developed and agencies will implement SBIR programs that satisfy the intent of the bill, as well as minimize the administrative burden to the agencies and small businesses.

In addition to the cost of the SBIR programs within these agencies, it is estimated that approximately $0.2 million in fiscal year 1983, $0.3 million in fiscal years 1984 and 1985, and $0.4 million in each year thereafter will be required by those federal agencies that have responsibility for coordinating, monitoring, and reporting to the Congress. This assumes that the Office of Science and Technology Policy will simply review agency reports and not conduct independent audits in order to fulfill its oversight mandate.

Finally, while it is not possible to estimate their impact, two additional factors could affect the long-term cost of the bill. Some studies suggest that small firms make a significant contribution to innovations, and that the cost per R&D scientist is less in a smaller firm. If this is true, some savings may be obtained in the long-term by directing more R&D spending to small businesses. On the other hand, in some areas only a few small firms might be qualified to perform the work, and lack of competition could result in higher costs.

7. Estimate comparison: None.

8. Previous CBO estimate: On September 24, 1981, the CBO prepared a cost estimate for S. 881, as ordered reported by the Senate Select Committee on Small Business. The total R&D budget estimates which form the basis for the cost estimate for this version of H.R. 4326 are lower in each fiscal year because the current 1982 funding base is lower than the funding level assumed for S. 881. S. 881 excluded in-house research, but specified the same percentage amounts for set-asides. For S. 881 it was assumed that SBIR activity would begin in fiscal year 1982, while for this version of H.R. 4326 it is assumed that R&D set-asides would not be available until the beginning of fiscal year 1983. H.R. 4326 also simplifies and eliminates various review and administrative requirements; the net result is slightly lower costs in each fiscal year than in S. 881.

On October 30, 1981, the CBO prepared a cost estimate for H.R. 4326, as ordered reported by the House Committee on Small Business. The percentage set-aside was larger in that version of H.R. 4326, resulting in larger SBIR programs and consequently, higher administrative costs.

On March 2, 1982, the CBO prepared a cost estimate for H.R. 4326, as ordered reported by the House Committee on Veterans' Affairs. This version of the Small Business Innovation Act basically amended H.R. 4326, as ordered reported by the House Committee on Small Business, but excluded the Veterans' Administration

from all provisions of this bill. As a result of the larger percentage set-asides, the estimated costs were also higher.

9. Estimate prepared by: Mary Maginniss (226–2860).

10. Estimate approved by:

C. G. NUCKOLS
(For James L. Blum,
Assistant Director for Budget Analysis).

XI. COMMITTEE RECOMMENDATION

A quorum being present, the Committee ordered H.R. 4326 reported with an amendment by unanimous voice vote of those present on March 9, 1982.

XII. CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3 of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

SMALL BUSINESS ACT

* * * * * * *

SEC. 9. (a) Research and development are major factors in the growth and progress of industry and the national economy. The expense of carrying on research and development programs is beyond the means of many small-business concerns, and such concerns are handicapped in obtaining the benefits of research and development programs conducted at Government expense. These small-business concerns are thereby placed at a competitive disadvantage. This weakens the competitive free enterprise system and prevents the orderly development of the national economy. It is the policy of the Congress that assistance be given to small-business concerns to enable them to undertake and to obtain the benefits of research and development in order to maintain and strengthen the competitive free enterprise system and the national economy.

(b) It shall be the duty of the Administration, and it is hereby empowered—

(1) to assist small-business concerns to obtain Government contracts for research and development;

(2) to assist small-business concerns to obtain the benefits of research and development performed under Government contracts or at Government expense; [and]

(3) to provide technical assistance to small-business concerns to accomplish the purposes of this section[.];

(4) to develop and maintain a source file and an information program to assure each qualified and interested small business concern the opportunity to participate in Federal agency small business innovation research programs;

(5) to coordinate with particpating agencies a schedule for release of SBIR solicitations, and to prepare a master release schedule so as to maximize small businesses' opportunities to respond to solicitations;

(6) to report annually to the Office of Science and Technology Policy on the SBIR program responsibilities assigned to it under this Act; and

(7) to report not less than annually to the Senate and the House of Representatives on the SBIR programs of the Federal agencies and the Administration's responsibilities related to the SBIR programs.

* * * * * * *

(e) For the purpose of this section—

(1) the term "Federal agency" means an executive agency as defined in section 105 of title 5, United States Code, or a military department as defined in section 102 of such title;

(2) the term "funding agreement" means any contract, grant, or cooperative agreement entered into between any Federal agency and any small business for the performance of experimental, developmental, or research work funded in whole or in part by the Federal Government;

(3) the term "small business innovation research program" or "SBIR program" means a competitive program designed to involve small businesses in meeting Federal research and development objectives and to promote innovation through a uniform process having—

(A) a first phase for determining, insofar as possible, the scientific and technical merit and feasibility of proposals submitted pursuant to SBIR program solicitations;

(B) a second phase to further develop the proposals to meet the particular program needs, the awarding of which shall take into consideration the scientific and technical merit and feasibility evidenced by the first phase and, if two or more proposals are evaluated as being of approximately equal scientific and technical merit and feasibility, special consideration shall be given to those proposals that have demonstrated third phase, private capital commitments; and

(C) when appropriate, a third phase in which commercial applications of the research or research and development are pursued with private capital or in which contracts are made with a Federal agency for products or processes intended to benefit the United States Government; and

(4) the term "research" or "research and development" means any activity which is (A) a systematic, intensive study directed toward greater knowledge or understanding of the subject studied; (B) a systematic study directed specifically toward applying new knowledge to meet a recognized need; or (C) a systematic application of knowledge toward the production of useful materials, devices, and systems or methods, including design, development, and improvement of prototypes and new processes to meet specific requirements.

(f)(1) Each Federal agency which has total appropriations in excess of $100,000,000 for research or research and development for fiscal year 1983 or any fiscal year thereafter shall establish a SBIR program.

(2) Each Federal agency which is required to establish a SBIR program under paragraph (1) shall, to the extent required in Acts authorizing appropriations for each such agency, reserve for expenditure with small business concerns in connection with such SBIR program—

(A) not less than 0.2 per centum of its total appropriations for research or research and development in the first fiscal year in which it is required to establish a SBIR program,

(B) not less than 0.6 per centum of such total appropriations in the second such fiscal year, and

(C) not less than 1 per centum of such total appropriations in all subsequent such fiscal years.

(g) For the purpose of meeting the requirements of subsection (f), no Federal agency shall make available, from that portion of its total appropriations for research or research and development which is available for obligation for basic research, an amount which exceeds 0.2 per centum of such portion in the first fiscal year in which it is required to establish a SBIR Program, 0.6 per centum of such portion in the second such fiscal year, or 1 per centum of such portion in subsequent such fiscal years.

(h) Each Federal agency required by subsection (f) to establish a small business innovation research program shall—

(1) unilaterally determine categories of projects to be in its SBIR program;

(2) issue small business innovation research solicitations in accordance with a schedule determined cooperatively with the Small Business Administration;

(3) unilaterally receive and evaluate proposals resultng from SBIR soliciations;

(4) unilaterally select awardees for its SBIR funding agreements;

(5) administer its own SBIR funding agreements (or delegate such administration to another agency);

(6) make payments to recipients of SBIR funding agreements on the basis of progress toward or completion of the funding agreement requirements; and

(7) make an annual report on the SBIR program to the Small Business Administration and the Office of Science and Technology Policy.

(i) In addition to the requirements of subsection (f), each Federal agency which has total appropriations in excess of $20,000,000 for research or research and development for fiscal year 1983 or any fiscal year thereafter shall establish goals specifically for funding agreements for research or research and development to small business concerns.

(j) Each Federal agency required by this section to have a SBIR program or to establish goals shall report annually to the Small Business Administration the number of awards pursuant to funding agreements over $10,000 in amount and the dollar value of all such awards, identifying SBIR awards and comparing the number and amount of such awards with awards to other than small business concerns.

(k) In addition to the requirements of subsection (h), each Federal agency shall encourage and facilitate the general conduct of its

SBIR program to provide maximum opportunity for small businesses to engage in specified agency research and development objectives through the establishment of procedures which provide for—

(1) simplified, standardized, and timely SBIR solicitations; and

(2) a simplified, standardized funding process which provides for (A) the timely receipt and review of proposals; (B) outside peer review, as appropriate; (C) protection of proprietary information provided in proposals; (D) selection of awardees; (E) retention of rights in data generated in the performance of the contract by the small business concern; (F) transfer of title to property provided by the agency to the small business concern if such a transfer would be more cost effective than recovery of the property by the agency; (G) cost sharing; and (H) cost principles and payment schedules.

(l) The Director of the Office of Science and Technology Policy, in consultation with the Federal Coordinating Council for Science, Engineering and Technology, shall—

(1) independently survey and monitor all phases of the implementation and operation of SBIR programs within agencies required to establish a SBIR program, including compliance with the expenditures of funds according to the requirements of subsection (f) of this section; and

(2) report not less than annually, and at such other times as the Director may deem appropriate, to the Senate and the House of Representatives on all phases of the implementation and operation of SBIR programs within agencies required to establish a SBIR program, together with such recommendations as the Director may deem appropriate.

ADDITIONAL VIEWS OF HON. MARGARET M. HECKLER SMALL BUSINESS INNOVATION DEVELOPMENT ACT (H.R. 4326) MARCH 9, 1982

As a long time supporter of small business, I was very pleased to see this substantial piece of legislation come before this Committee. The fact that the Senate passed a similar bill (S. 881) on a 90–0 vote is indicative of the need and bipartisan support for good legislation benefiting small business.

However, due to the nature of the Committee amendment I had to vote against it, and have submitted these additional views to explain my opposition.

Now, the track record for small business is fantastic. They are the greatest source for innovation and job creation. Most people, including Members of Congress, are surprised to discover that small businesses comprise 97 percent of all U.S. firms; generate 38 percent of the Gross National Product (GNP); are responsible for 64 percent of wholesaling and 73 percent of retail sales; comprise 76 percent of construction (in dollar volume) and employ 58 percent of the American work force.

In a study of 5.6 million small firms for the Department of Commerce, it was reported that businesses with 20 or fewer employees created 66 percent of all net new jobs in the private sector between 1969–1976. And if you include firms of up to 500 employees, they account for 37 percent of all new jobs. In addition, 80 percent of new jobs were generated by businesses under five years old.

The figures dealing with innovation are even more impressive. The ratio of innovations to the R&D employment is four fold larger in businesses with fewer than 1,000 employees than for larger firms. If you compare this group with firms employing over 10,000 people, the rate of innovaton is 24 times higher for the smaller business. Also, the majority of all patents come from individuals and shall enterprises, a reflection of the innovative capacity of small business.

I am going over some of these figures only because 1 want to contrast them to one other figure, namely, the percent of federal R&D money that is devoted to these most efficient innovators and job creators. That number is disgracefully low: 4 percent. There have been several federal initiatives to increase this number, but the inbred prejudices in the federal agencies that divert 96 percent of federal R&D funds away from small firms has yet to be overcome.

One of the primary problems facing small businesses that want to deal with the government is the federal procurement system. It has become so tangled and complex with regulations and bureaucratic procedures that small business is choking in the bewildering morass of paper work. The problem is further complicated by the general failure to implement laws intended to increase the small business share, government competition with the private sector,

and slow and late payments to small contractors costing industry hundreds of millions of dollars a year. It comes as no surprise, then, that the small business share of GNP has declined in all sectors in the last decade.

At the same time the small business share of GNP is declining, this country is experiencing a drop in our levels of innovation and productivity. When the most innovative and productive sector of private industry is in a state of decline, it follows that the economy's overall performance will commensurately suffer.

This is why this legislation is so important. It would ensure that a minimum of 1 percent of federal R&D dollars would be spent by that sector of the economy known for its high levels of performance and employment generation. The creative resources and risk-taking nature inherent in the entrepreneural spirit of small business is the driving force behind their success. Research and development dollars are important because this is precisely where the most productive innovations take place. The bill's intention of directing specific funding levels to science and technology based firms is, therefore, a proven and incredibly efficient means of bolstering employment levels and general economic productivity.

I supported the Small Business Innovation and Development Act as it was reported out of the Senate, and supported the efforts in this Committee to amend the House version in a like fashion. Unfortunately, the Committee went much too far in amending the bill and has now jeopardized the entire piece of legislation. For this reason I opposed the final Committee amendment because it subjects the specific funding levels mandated in the bill to individual committee authorization. We know what the outcome of this provision will be because we have seen what other committees are doing as they markup the bill—they are exempting the agencies within their jurisdiction.

The Committee's action will do great harm to the bill if accepted by the House. It is my intention to oppose any efforts on the House Floor to leave the fulfillment of specific funding targets up to individual committee authorization. Such an amendment fails to recognize the proven need for this legislation, and is a regrettable attempt to weaken the bill. The Committee's amendment is bad for small business, the economy, and the American people.

MARGARET M. HECKLER.

○